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El Niño or Not? [1]

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In 1995 an EOS investigator brought together data from two DAACs and four sensors to gain a view of a 1994 Pacific warming event that may or may not have been an El Niño.

"For the first time we have an array of sensors that gives us most of the quality data we need to look at whole events," says investigator Timothy Liu. "It's like the difference between feeling the toes or the tail of the elephant and seeing the whole animal at the same time."

Multi-sensor data provide novel view of Pacific warming event.

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The 1994 event that Liu observed was less intense than the El Niños of the 1980s, and consisted of four separate and sequential episodes in six months. "If we call this recent warming an El Niño," says Liu, "it is really quite different from how people have conceived of an El Niño before."

Each of the four episodes Liu detected began with equatorial westerly wind irregularities. These he saw in ERS-1 scatterometer data distributed by the Jet Propulsion Laboratory Physical Oceanography DAAC. Each wind anomaly initiated eastward propagating waves that in turn caused sea level rises. Liu recognized the sea level rises in TOPEX/Poseidon altimeter data that he examined.

Coincident with and near each sea level rise, Liu identified a rise in sea surface temperatures using visible-infrared radiometer data from the National Center for Environmental Prediction (NCEP), formerly the National Meteorological Center (NMC). Finally, in SSM/I water vapor data from the Marshall Space Flight Center DAAC, Liu identified water vapor increases that occurred during the surface warming episodes.

Liu's investigation of these events in the tropical Pacific would not have been possible without the combination of data he used. "With data from only one sensor, you only get a part of the story. With four sensors up at the same time, you can piece the whole story together much better," he says.

After seeing the four episodes within the event, Liu used an ocean general circulation model to corroborate his observations. Forced with the observed winds, the model produced the observed sea level and temperature responses in the appropriate times and locations

Despite this theoretical link between the observed forcing and responses, whether the 1994 warming event is an El Niño is still open to argument. Nevertheless, Liu's observations provide an expanded view of tropical Pacific warming events. His findings also point to the new investigative possibilities offered by the use of complementary DAAC data sets

"That we can now do this sort of work is the essence of EOS," says Liu, who is the Principal Investigator on the Interdisciplinary Science Investigation (IDS) Team exploring the role of air-sea exchanges and ocean circulation in climate variability. "It helps very much that the data centers are providing us with easy access to a variety of data from different sensors."

Reference(s)

Liu, W. T., Tang, W., and L.-L. Fu. 1995. EOS Transactions. 76(43):429-37.

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